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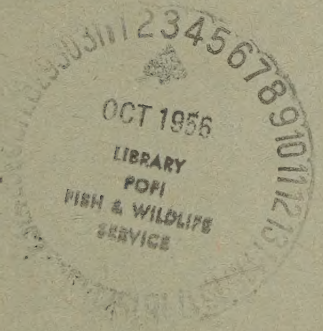
FISKERIDIREKTORATETS SKRIFTER
Serie Havundersøkelser
(*Report on Norwegian Fishery and Marine Investigations*)
Vol. XI. No. 5
Published by the Director of Fisheries

THERAGRA FINNMARCHICA N. SP.

GADUS POUTASSOU, RISSO
RAIA SPINICAUDA, JENSEN

EUMICROTREMUS SPINOSUS SUBSPEC. NOV. EGGVINII

By
EINAR KOEFOED



1956
A/S JOHN GRIEGS BOKTRYKKERI, BERGEN

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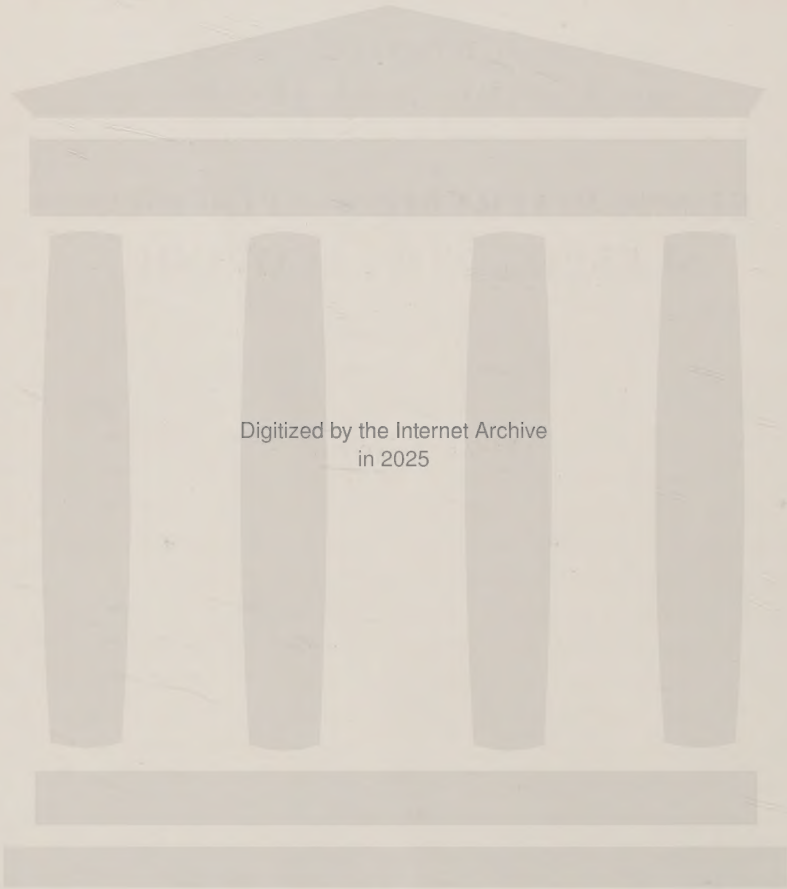

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Theragra finnmarchica, n. sp. A fish caught off Berlevåg allied to the Alaskan pollack, Theragra chalcogramma Pallas from the Bering Sea.

Pl. I and II.

The Fisheries Advisor Gunnar Rollefsen detected in the middle of May 1932 among the fishes landed in Berlevaag, Finnmark, 3 strange specimens with navy-blue color on the back and silver-white on the vent. He preserved 2 specimens and has kindly presented them to me.

Both have the length of nearly half a meter. One specimen is a male with well developed testes. The fishes have a slender shape, the height 5½ to 6 in body length. The height of caudal peduncle is 22.0 and 22.8 in body length. Anus is situated below the interspace between D_1 and D_2. The pectorals reach also below this interspace and end over the origin of A_1 but not farther. The ventrals reach a vertical below the middle of D_1. The dorsals are separated, the anals likewise. The caudal is lunate. The lateral line forms an arch and continues from below D_2 in the middle of the body. The length of the head is 3¾ to 4 in the length of body, snout is 3 and eye is 5 to 5⅖ in length of head. The mandible protrudes beyond the upper jaw and has a minute barbel. The teeth in upper jaw form a narrow brush with a row of larger teeth outside. A row of teeth on the mandible, anteriorly small, posteriorly larger. No teeth on palatina. The vomer has 2 to 3 rows of small acute teeth. The gill membranes are coalesced below. The first gill arch has 5 gill rakers above the angle, 33 below. Appendices pyloricae are numerous. Besides the observation by Mr. Rollefsen, that the back was navy-blue and the vent silverwhite, it is even now evident that the pectorals have been dark, certainly dark blue and also faint indications of a marbled colour on the foremost part of the body and two dark stripes along the tail are visible.

D_1 13; D_2 16—17; D_3 18—20; A_1 19—20; A_2 19—20; P 19 rays. Scales cycloid, imbricate, between D_1 and lin. lat. 22—24 with 8 growth zones. This is the only scale counting, which I have found possibly to get exactly for comparison; Vertebrae 51 præcaudal 18.

It may especially be mentioned, that the surface of the suboperculum is vaulted, ossified, hard and stout and that postclavicula is club-shaped.

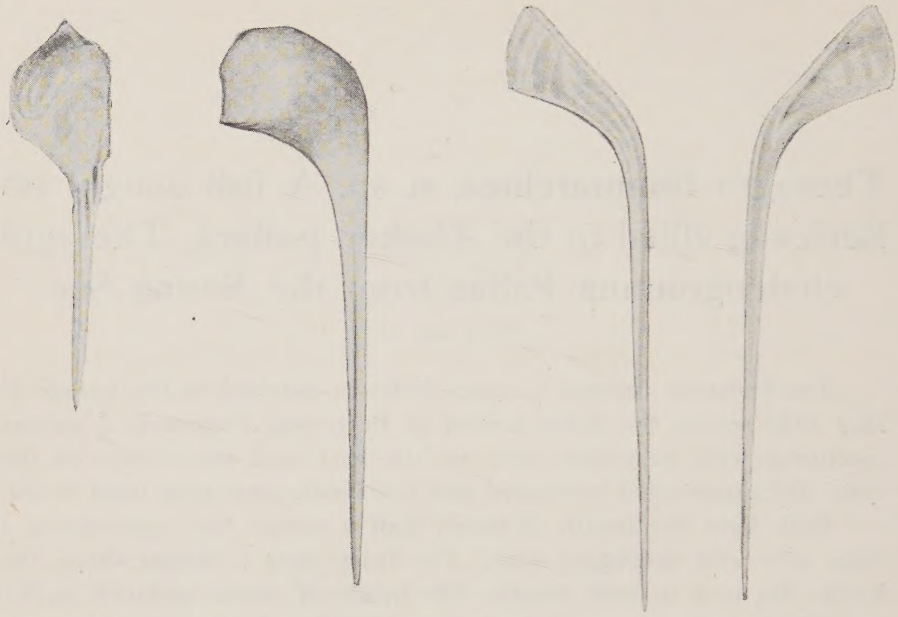

Fig. I. Postclavicula.
1. Theragra chalcogramma, Pallas 60 cm 1/1.
2. Theragra finnmarchica, n. sp. 50 cm 2/1.
3. Gadus pollachius, L 2/1.
Th. Rasmussen del.

Its lower part is slender, weakly pointed, but its dorsal or proximal part is nearly quadrangular with the upper corners rounded and forming a right angle with the slender stalk. The sides of the proximal part are vaulted, so that the ivory hard head of the club is 4 mm thick (fig. 1).

In *Gadus pollachius* of the same size the proximal part of postclavicula is formed as a spatula nearly membranaceous about 1 mm thick.

According to this description the appearance of the fish shows some resemblance with the illustrations of the Alaskan pollack as in LUCAS 1899 pl. XIII and in SOLDATOV and LINDBERG 1930 p. 513 fig. 74.

The character of postclavicula and suboperculum especially directs the mind towards *Theragra* from The Bering Sea. FREDERIC A. LUCAS writes in his note on p. 486 in JORDAN and GILBERT «The fishes of *Bering Sea*». Rept. Fur Seal Invest. III 1899: «The Alaskan pollack differs from the Atlantic pollack .... The greatest differences between the two species however, are to be found in the gill covers, for the suboperculum of the Alaskan pollack is thick, smooth and dense, instead of being thin and squamous. The postclavicle is also similar in structure, while its proximal portion is subcircular in the Alaskan species and rhomboidal in the Atlantic. This ivory-like character of the suboper-

culum and postclavicle is so marked (in the Alaskan form) that it serves to distinguish these bones at a glance being entirely different from what is found in the corresponding bones of other gadoids ....»

JORDAN and EVERMAN 1898 III p. 2535 remark the same and add: «The Alaskan Pollack farther differs from the Atlantic Pollack in having 19 precaudal vertebrae and 33 caudal», as the two fishes from Finnmark «instead of 23 precaudals and 32 caudals». Finally SCHULTZ and WELANDER (1935 p. 129) note: «Subopercle and postclavicle swollen, ivory-like in adults (but normal in young)».

It may be curious if *Theragra* appears off the coast of Finnmark, when according to Russian ichthyologists it is not fished along the whole Northern coast of Asia. That sporadic occurence of other species may exist is noted by SCHMIDT and ANDRIASHEV (1935 pp. 57 & 60) in three examples namely *Hemitripterus americanus, Gmelin* or *H. villosus, Pallas, Stichaeus punctatus, Fabricius* and *Eumesogrammus praecisus, Krøyer.*

Meanwhile Dr. ARTHUR D. WELANDER very kindly sent me some small *Theragra* from the Bering Sea for comparison. The specimens agreed well with the Norwegian fishes except that the eye was relatively larger, possibly due to age.

Dr. Welander continued most kindly his persevering efforts and has now procured me a fine specimen of *Theragra* of 60 cm.

In this the eye goes 4.5 times in the head against 4.9 and 5.4 in the Finnmark fishes. SCHULTZ and WELANDER (1935 p. 129) have already stated the «eye 3.3 to 4.7 in head, larger than in any other cod in this region». In the litterature there are some diverging statements on this proportion.

In «A contribution to the ichthylogy of Alaska» 1873 p. 30 *Cope* writes that the eye in *Gadus periscopus*, identical with *Theragra chalcogramma*, goes 4.5 times in the head. JORDAN and GILBERT in «Synopsis of the fishes of North America» 1882 p. 807 note «eye large .... 4 in head», but the same authors in «The fishes of Bering Sea» 1899 p. 486 «eye 5». JORDAN and EVERMAN in «Fishes of North and Middle America» part III 1898 p. 2535 state «Eye 5 in head» but 3 lines below «eye large .... 4 in head» just the same as in the above mentioned synopsis. Further the eye goes only 3.5 times in the head according to fig. 11 pl. IV in the «Important food fishes from the trawling grounds off the coast of the maritime (Siberia)». Bull. gov. exp. st. Chosen 1936.

Another character, which caused some uncertainty was the dentition. PALLAS (1831, III p. 198) writes «dentes acicularis in maxillis, duabus lineis palati» and in a fish in the Zoological Museum in Copenhagen labelled as *Pollachius chalcogrammes* and measuring 169 mm from Unalashka April 1st 1896 the palatina were toothbearing so far I could

observe without dissection on the single specimen in this museum. JORDAN & EVERMAN 1898 p. 2536 note, however, for *Theragra fucensis* «palatines toothless» and in the five *Theragra* which WELANDER kindly has sent, the palatines were without teeth. The measurements of these five are collected in a table. Besides the size of the eye it is obvious that the caudal peduncle in the specimen 600 mm is narrower than in the Finnmark fishes namely 3.3 % of the body length as against 4.2 and 4.4, or the caudal peduncle goes 30 times against 22 and 23 times in the body length. In the small specimens the caudal peduncle has nearly the same shape as in the Finnmark fishes. The colour in the large specimen is very well preserved. Below the first and second dorsal the skin is mottled with dark spots encircled by a bright ring, which below the third dorsal and towards the caudal fin are arranged in two dark stripes dorsally and ventrally for the lateral line. A blunt papilla before the anus is indication of the fish being a male. The scales show 8 growth zones. The first gillarch has five gillrakers placed above the angle. The chief points are that the subopercle and the dorsal part of the postclavicle are swollen and ivorylike. The dorsal part of the postclavicle is, however, formed as a rhomboidal dilatation directly in continuation of the ventral stalk.

The result is that the two fishes from the sea off Finnmark are not identical with the species *Theragra chalcogramma*. The resemblance is, however, so great, as to indicate a local subspecies but three features are so characteristic that it seems more correct to consider them as belonging to a distinct species. The features are the following:

The eye is relatively small, goes 4.9 to 5.4 times in the head. The caudal peduncle is broad 4.2 and 4.4 % of the body length. The dorsal clubshaped part of the postclavicle forms a right angle with the ventral slender part. These are the results of the observations but is it logical that the described fishes represent a distinct species when only 3 were caught in 1932 with no record in the twenty years since?

Professor A. D. Welander in Seattle has as already noted kindly sent me five Theragra and he has further conferred on me the favour to correct my manuscript, therefore I am greatly indebted to him.

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	Theragra chalcogramma. Pallas. Observations.						Theragra finnmarchica, n. sp. observations	
	Yakutat Bay Alaska Fish School Univers Seattle		90 miles south of Nunivak Island		Unalashka Aleut Isl. Zool. Mus. Copenhagen	N 51°11' E 170°23'	Berlevåg Finnmark Norway.	
Total length mm	132	162	177	209	169	600	ca. 480	500
Length of body	118	145	159	193	155	545	440	455
Length of head	36	40	47	50	41	135	117	113
Length of snout	10	13	15	16	11	42	38.5	39
Horiz diam. of eye	9	11	12	13	10	30	21.5	23
Interorbital space	8.2	9	11	13	8	33	30	29
Length of barbel	1.8	2	2.5	1	minute	2	ca. 2	
Height at origin P	24	29	27	44	26	99	75	83
Height at origin D_1	25.5	30.5	28.5	44	25	103	76	83
Height at D_2—D_3, A_1—A_2 .	14	18	15	19	16	55	51	61
Height at caud. peduncle .	6	7	6.5	7.5	7.2	18	20	20
Interval D_1—D_2	6	7	10	12	7	29	15	27
Interval D_2—D_3	9	10	7.5	12	13	34	35	33
Interval A_1—A_2	6	7	6	11	12	32	26	29
Base of D_1	14	17	21	25	17	67	49	50
Base of D_2	19	22	24	31	21	86	72	70

Base of D_3	17.5	25	24	32	24	83	68	76
Base of A_1	24	31	24	32	29	105	90	89
Base of A_2	21	24	24	35	24.5	87	65	77
Sn- D_1	43	49	49	61	50	178	141	147
Sn- A_1	54	72	84	92	76	262	213	213
Interval D_2—C	6.5	7	8	11	11	34	29	23
Interval A_3—C	6	7	5	10	11	29	25	23
Dist. A_2 to end of body	17	19	17	27	21	70	54	57
Length of P	18	25	31	39		102	69.5	84
Rays D_1	12	12	13	13	c. 14	14	13	13
Rays D_2	16	16	15	13	c. 12	16	16	17
Rays D_3	18	19	19	19	c. 15	20	18	20
Rays A_1	19	18	16	16	c. 19	21	20	19
Rays A_2	19	19	19	20	c. 19	20	19	20
Rays P	20	20	20	c. 20	c. 19	20	19	19
Scales D_1—lat lin	c. 20	c. 20			(c. 20?)	20	22—24	22—24
Vertebrae	c. 50	c. 52					51	
Scales	imbricate	imbr.			imbr.	imbr.	imbr.	imbr.
Mandible	protruding	slight protr.			protrud.	protrud.	protrud.	protrud.
Palatineteeth	None	None	None	None	so far possible to distinguish toothbearing	None	None	None
Caudal	lunate	lunate				lunate	lunate	lunate

	Theragra chalcogramma Pallas Proportions						Theragra finnmarchica, n.sp. Proportions	
	Yakutat Bay Alaska Fish School Univers. Seattle		90 miles south of Nunivak Island		Unalashka Aleut Isl. Zool. Mus. Copenhagen	N 51°11' E 170°23'	Berlevåg Finnmark Norway	
Total length mm	132	162	177	209	169	600	480	500
Length of body	118	145	159	193	155	545	440	455
Length of head to length of body	1:3.28	1:3.62	1:3.38	1:3.86	1:3.78	1:4.04	1:3.76	1:4.03
Length of snout to length of head	1:3.6	1:3.08	1:3.13	1:3.12	1:3.72	1:3.22	1:3.04	1:2.90
Horiz.diam. of eye to length of head	1:4.0	1:3.64	1:3.92	1:3.84	1:4.1	1:4.5	1:5.44	1:4.91
Interorbital space to length of head	1:4.4	1:4.44	1:4.27	1:3.84	1:5.13	1:4.09	1:3.90	1:3.90
Height at origin P to length of body	1:4.92	1:5.00	1:5.9	1:4.39	1:5.96	1:5.5	1:5.87	1:5.49
Height at caud. peduncle length of body	1:19.7	1:20.7	1:24.4	1:25.6	1:21.5	1:30.2	1:22.0	1:22.8
Length of P to length of head	1:1.67	1:1.38	1:1.52	1:1.28		1:1.32	1:1.66	1:1.34

	Theragra chalcogramma Pallas Per cents						Theragra finnmarchica, n.sp. Per cents	
	Yakutat Bay Alaska Fish School Univers. Seattle		90 miles south of Nunivak Island		Unalashka Aleut Isl. Zool. Mus. Copenhagen	511°1' E 170°23'	Berlevåg Finnmark Norway	
Total length mm	132	162	177	209	169	600	480	500
Length of body	118	145	159	193	155	545	440	455
Length of head	30.6 of length of body	27.6	29.6	25.9	26.4	24.8	26.6	24.8
Length of snout	27.8 —— head	32.4	32.0	32.0	26.8	31.2	34.1	34.4
Horiz.diam. of eye	25.0 —»—	27.4	25.6	26.0	24.4	22.2	18.4	20.4
Interorbital space	22.8 —»—	22.5	23.4	26.0	19.5	24.4	25.7	25.6
Height at origin P	20.4 —»— body	20.0	17.0	22.8	16.8	18.2	15.6	18.2
Height at caud.peduncle	5.08 —»—	4.8	4.1	3.88	4.65	3.3	4.2	4.4
Base of D_1	11.9 —»—	11.7	13.2	13.0	11.0	12.3	11.4	11.0
Base of D_2	16.1 —»—	15.2	15.1	16.1	13.5	15.8	16.7	15.4
Base of D_3	14.85 —»—	17.3	15.1	16.6	15.5	15.3	15.8	16.7
Base of A_1	20.3 —»—	21.4	15.1	16.6	18.7	19.3	20.5	19.6
Base of A_2	17.8 —»—	16.6	15.1	18.2	15.8	16.0	15.3	16.9
Sn—D_1	36.4 —»—	33.8	30.8	31.6	32.2	32.3	32.0	38.3
Sn—A_1	45.6 —»—	49.6	52.9	47.6	49.0	48.0	48.5	46.9
Interval D_3—C	5.5 —»—	4.8	5.04	5.7	7.1	6.3	6.6	5.6
Interval A_2—C	5.1 —»—	4.8	3.14	5.2	7.1	5.3	5.2	5.6
Dist. A_2 to end of body	14.4 —»—	13.2	10.7	14.0	13.6	12.8	12.3	12.5

GADUS POUTASSOU, RISSO

Appendices pyloricae.

Pl. III A.

A. Risso mentions nothing about appendices pyloricae in his Histoire Naturelle des Prinsipales Productions de L'Europe Meridionale, tome III Paris 1826, but C. G. Costa writes in Fauna del Regno di Napoli. Pesci. parte prima Napoli 1850 on page 9 «Importantissima eccezione fa in questa specie la macanza di appendici cieche» and «nè vi è alcuna sorta di appendice cieca». This remark reappears later in the literature. F. A. Smitt in Skandinaviens Fiskar I Stockholm 1892 p. 465 writes as follows: «Den första serien har i vår fauna en art, Kolmulen, som i sin saknad af krams kommer närmast intill kummeln» — Translated: The first series is in our fauna represented by a species the poutassou which by the absence of coeca is most related to the hake — and in page 512 he writes «och med hänsyn till de inre organen hafva vi redan ofvan anmärkt den egendomlighet at kolmulen saknar krams». — Translated: and with respect to the viscera we have already above noted the peculiarity that the poutassou lacks coeca. —

In Grimpe — Wagler: Die Tierwelt der Nord- und Ostsee. Die Fische Leipzig 1929, part XII g 2 page 61 W. Schnakenbeck notes nearly the same «Gadus poutassou besitzt auch in der inneren Anatomie ein besonderes Merkmal, das ihm eine Ausnahmestellung innerhalb der Gattung gibt. Er hat nämlich keine Pylorusanhänge, und damit kommt er Merluccius vulgaris nahe, der nur einen Anhang am Pylorus besitzt».

Ehrenbaum states summarily «Coeca are absent» p. 117 Naturgeschichte und wirtschaftliche Bedeutung der Seefische Nordeuropas. Handbuch der Seefischerei Nordeuropas. Bd. II, Stuttgart 1936.

The paper of H. Chas. Williamson: On the specific characters of the haddock etc. Twenty — sixth Rep. Fish Board Scotland for 1907, pt. III. Sc. invest. Glasgow 1909 is overlooked. He writes there p. 120 «Poutassou — The coeca were from 9 to 15 in number».

Investigation of Gadus poutassou caught on the cruises made by fisheries advisor Thor Iversen in the seas to the west of Spitzbergen and in the Denmark Strait has shown, that they have 8—11 appendices

pyloricae. Also specimens from more southern regions were investigated namely specimens in the Zoological Museum in Bergen from Spain off Bilbao and from Norway at Drøbak and Nordfjordeid, further from Lusterfjord in a depth of 120 m caught by Olav Aasen and from the Norwegian Sea N. 64°05′ W.8°13′ fished by Finn Devold on herring-nets about 20 m below the surface. The number was not easy to count on all the specimens owing to the conservation, but was obviously from 6 to 10 coeca.

West of Spitzbergen the content of the stomachs was chiefly *Themisto libellula, Mandt* and *Schizopods*, one *Pandalus borealis, Krøyer* (the fish caught by shrimptrawl), also a few remains of fishes were found. This agrees with the statement of A. Svetovidov in «On the correlation between the character of food and the number of pyloric caeca in fishes» C.r.ac.sc. URSS. III. Leningrad 1934. On p. 70 he writes «the fishes living on larger organisms have a higher number of pyloric caeca than those feeding on smaller ones» in p. 68 «Number of p.c. *B. saida* 20—37, *E. navaga* 31—55, *G. morrhua* 207», in p. 71. «The principal food of *Boregadus saida* are the Euphausidae (in 59.5 % of the stomachs examined) and the planctonic organisms — *Calanus finmarchicus* (34.4 %). Crangonidae have been found only in 16, Amphipoda in 3 and Pisces only in 1 out of 311 stomachs .... Fishes form a greater part of the food of *Eleginus navaga* than of that of *Boreogadus saida*; out of 175 stomachs of *E. navaga* examined by N. Soldatov fishes were found in 13, — Pisces (14—88 %) [herring (*Cl. harengus*), capelin (M. villosus), sand — eel (Amm. tobianus) and others] and the benthonic and planctonic Crustacea (*Pandalus, Rhoda*) form the greater part of the food of *Gadus morrhua*».

Ad. S. Jensen writes in «On fish-otoliths in the bottom deposits of the sea» Medd. Kom. Havundersøg. I, 7. Kbh. 1905 p. 13 «*Gadus poutassou* .... It may have followed the salt and warm Atlantic water out on the surface of the Norwegian Sea». The specimens caught during Thor Iversen's research-cruises are all from localities with water of Atlantic origin:

20/7 1933 S/S Heimland St. 37. N. 65°58′ W. 28°58′ 361 m. In 340 m 1°07. G.p. 15 cm app. pyl. 11. From stomach of Cod.

10/6 1938 M/C Solveig I. St. 38. N. 77°16′ E. 11°28′ «Geiteryggen» 188—253 m. In 0 m 4°19, in 205 m 3°26. G.p. 27 cm app. pyl. 10. Content of stomach: Remains of Schizopods. From stomach of cod.

10/7 1938 M/C Solveig I. St. 78. N. 78°15′ E. 12°20′ — 12°32′ «Isfjordrenna» 257 m. Shrimptrawl. G.p. 22 cm, app. pyl. 9.

30/8 1939 M/C Solveig I. St. 122. N. 78°17′ E. 12°23′ «Rækesøyla» 259 m. Shrimptrawl. In St. 108. 13/8 N. 78°17′ E. 12°30′. «Rækesøyla».

In 0 m 5°09 in 240 m 2°27. G.p. 33 cm ♀ app. pyl. 8. Content of Stomach: Themisto libellula, Mandt, Schizopod and remains of fishes.
G.p. 28 cm ♀ app. pyl. 10. Content of stomach: Schizopodes.
G.p. 27 cm ♀ app. pyl. 10. Content of stomach: Themisto libellula. Mandt.
G.p. 27 cm ♂ app. pyl. 9. Content of stomach: Themisto libellula. Mandt and 1 Pandalus borealis, Krøyer.

Years ago this paper was written but not delivered for printing before March 1954. Unfortunately it has not been possible to get it printed, before I received the paper written by Henry B. Bigelow and William C. Schroeder: «Occurence off the Middle and North Atlantic United States of the Offshore Hake *Merluccius Albidus* (Mitchill) 1818 and of the Blue Whiting *Gadus* (*Micromesistius*) *Poutassou* (Risso) 1826» Bull. Mus. Comp. Zoology. Harvard College. Vol. 113, No. 2.

As a supplement to my paper I allow me to cite the remark on caeca pylorica in *Gadus poutassou*, which Bigelow and Schroeder write on p. 218:

«If so, Smitt's (1892, p. 465) account of poutassou as without pyloric caeca, would suggest an important anatomical difference between the two populations for there are 8 to 11 of these structures in the «Cap'n Bill II» specimens. But we have recently been informed by Denys W. Tucker of the British Museum (Natural History) that four specimens 241—274 mm in standard length from Lousy Bank, Lat. 60°20′ N. Long. 12°40′ W. 108—200 fathoms, which he examined, had 9, 10, 11 and 12 pyloric caeca, respectively, while one of the Norwegian specimens, mentioned above, has 10 caeca. Thus Smitt's account was incorrect in this respect.»

RAIA SPINICAUDA, JENSEN

The Rough Whiteray.

Several fish of this species have been caught since Adolph S. Jensen published his description based on six specimens from south-western Greenland in the memorial to Japetus Steenstrup, 1914.

Johannes Schmidt on board the «Dana» caught two: ♂ 116 cm and ♀ 125 cm: 31/7—1924, off southeastern Iceland N 64°36′ W 11°40′, depth 445 metres, gravel and stones.

On his expedition in the «Dana» in 1925 Adolph S. Jensen caught two specimens, 1 ♂ 35 cm and 12 ♀ 32 cm, on the 22nd of June at N 66°37′ W 56°37′, depth 460 metres, on a sandy bottom where the temperature was 3°12.

Paul Hansen, while carrying out fishery research off southwestern Greenland, captured 22 specimens on long lines in the district of Julianehaab at depths from 175 metres to 300 metres in the years 1930, 1934, and 1937. Twelve of these fish were males from 112 to 141 cm, and nine were females from 78 to 148 cm. No length or sex determination has been given for the remaining specimen. These catches, with specifications of dates and measurements, are mentioned in the paper by Ad. S. Jensen: «Contributions to the Ichthyofauna of Greenland, 8—24», p. 52.

In «Faune ichthyologique de l'Atlantique Nord» 1931, R. S. Clark published a description and figure (plate 54) of a female 172 cm long caught off Wester Horn Iceland at a depth of 140 to 160 metres.

J. Lundbeck, in «Mitteil. Deutschen Seefischerei-Vereins, 1933, p. 8, gives the information that trawlers off southeastern Iceland regularly find Raia spinicauda in hauls from great depths, only a few specimens, however, being taken at one time. On the other hand, all the rays landed from the region of Bear Island belonged to this species. He states further that the species is found in the Barents Sea north of the Murman Coast and on the Skolpen Bank, being however less numerous at the latter location.

The length was between 94 and 172 cm and even some of the largest males upto 147 cm were still immature. The forty fishes investigated were made up of equal numbers of males and females.

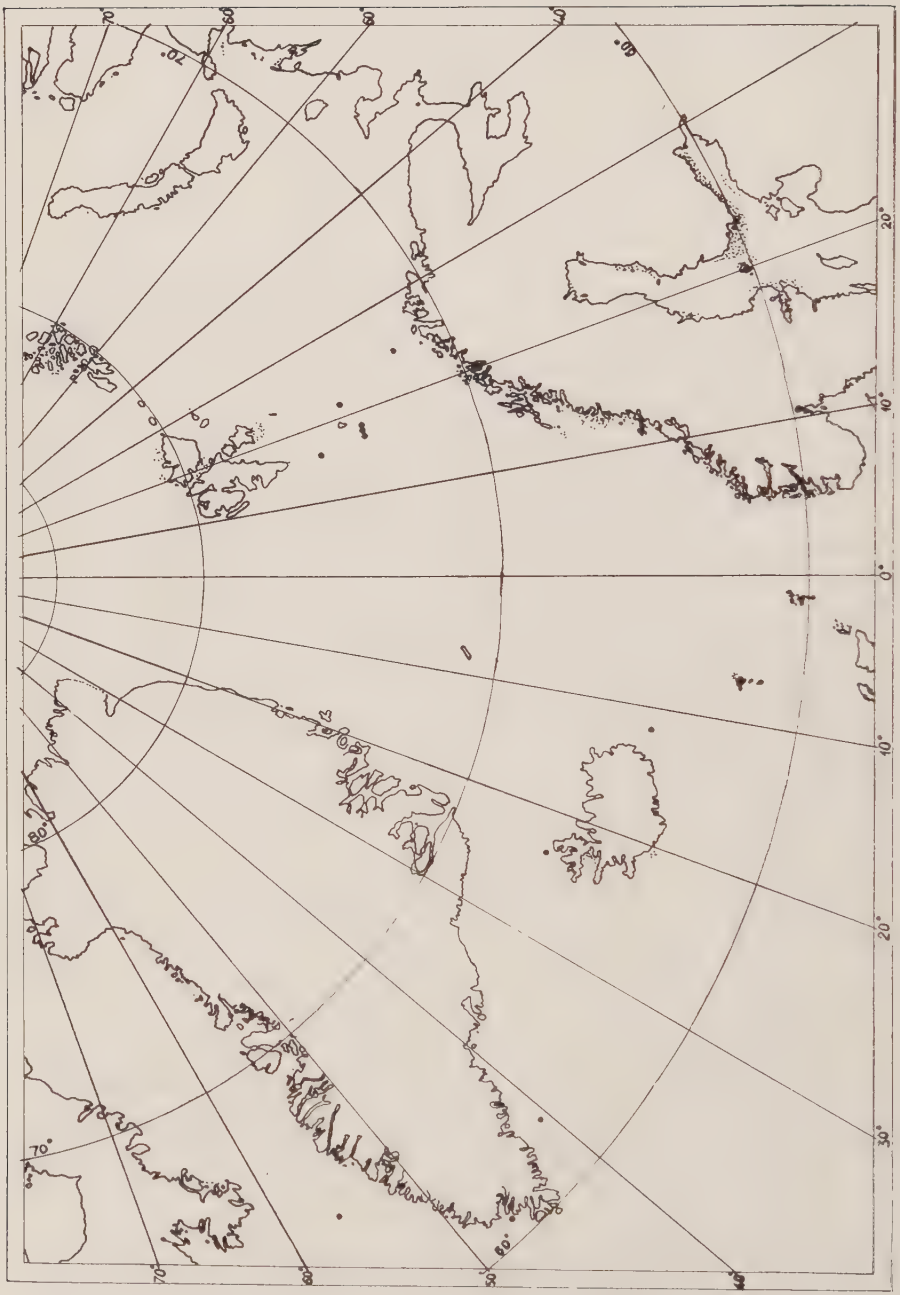

Fig. 1. Distribution of Raia Spinicauda Jensen.

Fig. 2. Contour of Raia spinicauda, Jensen, 92 cm ♂ and of the ventral with appendix genitalis.

37 specimens were caught on fishery research cruises made by Thor Iversen, one off Finnmark, 33 around Bear Island, one south-southwest of Hopen Island, and 2 off southeastern Greenland.

The width of the disc is larger than its length, and the tail is shorter than the disc. The snout forms nearly a right angle, the lateral corners of the disc are also almost right-angled but rounded. The length of the snout to a cross line drawn through the centre of the eyes amounts to about half of the width of the disc along the same cross line and to about three times the breadth of the cartilage between the eyes. The length of the snout to the foremargin of the eyes is about onefourth of the greatest width of the disc, and three times as large as the breadth of the interorbital cartilage. The distance from the tip of the snout to the foremost series of teeth is a little greater than double the distance between the nostrils. In the upper jaw there are 30 to 36 rows of teeth, in the lower jaw 28 to 34. The pointed teeth rise from a flat circular base, broadest in the females. Inside the rows of teeth there is, especially on the upper jaw, a strong pad richly covered with papillæ; along the upper jaw this pad is narrowest in the middle, broadest immediately to the right and to the left of the middle, tapering then towards the corners of the mouth; along the lower jaw the pad is narrow, but broadest in the middle, tapering strongly laterally and

disappearing near the corners of the mouth. A strong labial fold exists on the right and on the left side of the jaw and there is a fringed nasallobus.

The upper surface of the disc is entirely granulated. The spines are only to be found as a median row on the dorsal surface of the tail, 20 to 24 in number. There is, in addition, a spine between the two dorsals. The foremost spine is situated at the level of the middle of the ventrals. The spines are erect with exception of the anterior, which are slightly retrorse. The male, 133 cm, is equipped with 6 rows of claw-formed spines on the pectorals, the male, 138 cm, wears 5 rows of such spines. A small caudal fin ends the tip of the tail.

The colour of the dorsal surface is grey, a lateral fold of the skin on the tail being, however, white. The ventral surface is white, but the hindmargin of the pectorals and the ventrals, and the region around the cloaca are bluish grey and the tail is marbled.

Cod, redfish, and some fragments which are probably haddock and herring have been found in the stomachs. On the 11th of September at N. 73°53′ E. 17°46′, depth 200 metres, a female 164 cm long was caught with a fully developed egg on each side. In the last half of October the females in these waters at Bear Island had spawned. On a male 133 cm the appendix genitalis measured 31 cm of which 21 cm was free from the ventrals, on another 138 cm long the whole appendix measured 33 cm, and the free part 22 cm.

This paper was written many years ago but not delivered for printing before March 1954. In the years 1953 and 1954 Bigelow and Schroeder have, however, published exact descriptions and new facts on the distribution in the Western North Atlantic from Newfoundland to Cape Cod. My paper deals only with the Barents Sea, the waters around Iceland and Greenland. The publications of Bigelow and Schroeder are valuable supplements to the knowledge of *Raia spinicauda*.

P.S. A specimen of *Raia spinicauda* Jensen was caught 23 5 1955 by the Norwegian research ship «G. O. Sars.» north of Finnmark at N. 72°47′ E. 17°26′.

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Observations concerning 14 females and 8 males	♀							
Numbers	1	2	3	4	5	6	7	8
Total length; cm	74	90	98	105[3]	113	128	128	139
Width of disc	48.5			72.5	75	89	90	97
Tip of snout to foremargin of cloaca					61	69	67.5	
From foremargin of the cloaca to tip of tail	36[1]			49.3[1]	52.5	59	60.5	
Tip of snout to hind margin of pectoral (Clarks length of disc. B in the scheme of measurements)								
Tip of snout to a cross-line through the centre of the eyes	14.9			21.2	24.5		23.5	
Width of the cross-line through the centre of the eyes	28.3			40	43.5			
Tip of snout to the foremargin of the eyes. (Clarks length of snout, D in the scheme of measurements)								
Tip of snout to the mouth	14.3			19.4	23			
The smallest distance between the eyes. (Clarks interorbit-least width, E in the scheme of measurements)	3.7			5.7			8	
Distance between foremargin of eye and hind-margin of spiracle (Clarks F in the scheme of measurements)								
Distance midway between the nostrils (Clarks Internasal Width H in the scheme)	5.7[2]			7.6[2]			11	
Number of spines along the mid-line of the tail	26	25	22	22				21

[1] Length of the tail from hind-margin of anus. [2] Distance between the nostrils anteriorly.
[3] Before the conservation: 112 cm.

Nu. 1. N.64°14' W.55°55' 440 fathoms c. 3°2 described by Ad. S. Jensen.
» 2. Skovfjord, Southwest Greenland 120—160 fathoms 1°.7—2°.3 described by Ad. S. Jensen.
» 3. Skovfjord, Southwest Greenland 120—160 fathoms 1°.7—2°.3 described by Ad. S. Jensen.
» 4. The mouth of the firth: Tunugdliarfik 125—200 fathoms c. 1°.7—3° described by Ad. S. Jensen.
» 5. N. 74°12°5' E. 21°26' 216—272 met. sd. st. In 200 meters 1°66.
» 6. N. 73°50' E. 17°38' 250—264 met. sd. st. 2°70.
» 7. N. 64°36' W. 11°40' 445 met. gravel, st. 0°05 captured by S/S «Dana» Johs. Schmidt. Measured in Zool. Mus. Cph. by E. Koefoed.
» 8. The mouth of the firth: Tunugdliarfik. 125—200 fathoms c. 1°7—3° described by Ad. S. Jensen.

♀						♂							
9	10	11	12	13	14	15	16	17	18	19	20	21	22
158	161	164	169	170	172	92	108	116	133	138	148	150	160
	114	114		120	110	62		80	91	97	100	102	
87	88	91	94	99		47	58	60	70	73	77	81	83
71	73	73	75	71		45	50	56	63	64	71.5	69	77
						51			75	79			
						16.5		21.5	24	25	27		
						37					46		
						15							
						15			22	23	23		
						5		7.2	8				
						4.5							
						7.5		9	10				
						24			20				

Nu. 9. N. 73°53' E. 17°23' 259—263 met. sd. st. sh.
» 10. N. 73°53' E. 17°46' 197—222 met. st. sd.
» 11. —»—
» 12. —»—
» 13. N. 73°50' E. 17°38' 250—264 met. sd. st. 2°70.
» 14. Off Wester Horn, Iceland 140—160 met. Described by R. S. Clark 1931.
» 15. N. 74°38' E. 16°20' 539 met. sd. st. In 500 meters 3°63.
» 16. N. 73°53' E. 17°23' 259—263 met. sd. st. sh.
» 17. N. 64°36' W. 11°40' 445 meter gravel, st. 0°05 captured by S/S «Dana» Johs. Schmidt. Measured in Zool. Mus. Cph. by E. Koefoed.
» 18. N. 62°17' W. 40°34' 494 meter st., sponge.
» 19. —»—
» 20. N. 71°57' E. 24°53' 287 meter clay In 275 meter 4°45.
» 21. N. 73°50' E. 17°38' 250—264 meter st. sd. 2°70.
» 22. N. 73°53' E. 17°23' 259—263 meter st. sd. sh.

Eumicrotremus
Spinosus Subspec, Nov. Eggvinii.

Pl. III B, C, D.

1 specimen 90 mm, 19/6 1955, N. 70°54′, W. 12°50′. Dredge ca. 30 m. The fish was caught with a dredge on the Eggvin bank, discovered by the research ship m/s «G. O. Sars» during an oceanographical cruise under the leadership of Dr. phil. Jens Eggvin.

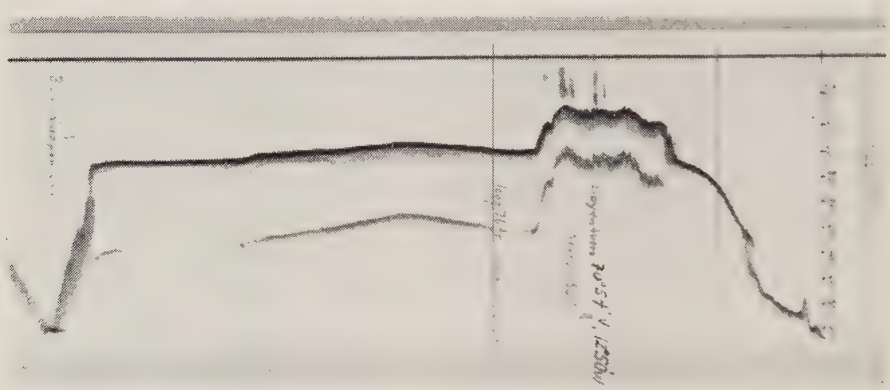

Fig. 1. Echogram showing the Eggvin Bank and the plain for dredging.

Length of the body	78	mm	
Length of the head from the foremost point	36	»	
Height at origin of D_1	40	»	
Largest breadth at gill-opening	38	»	
Gill-opening	7	»	
Horiz. diam. of eye	8	»	proportion to length of the head 4.5
Width of the mouth	23	»	

Below the mouth 4 short barbels. The skin between the mouth and the sucker consists for the rest of wrinckled folds. The sucker is partly encircled by the pectorals but the hindmost part is free. The first dorsal with 6 rays is enveloped in skin and the first four rays wear outermost one or two blunt spines or warts. The second dorsal with 11 rays is almost entirely free; there is only a low wall of soft skin at its base.

The anal consists of 11 rays also free, but the base is covered by spinous skin. The anus is situated only a little nearer to the sucker than to the anal.

The characteristic is that there exist distinct longitudinal series of granulated spines separated from each other. Most dorsally 5 granulated spines are seen from the upper margin of the eye to below the interspace of the two dorsals. Then a series from upper corner of gill-opening on the left side 4, on the right side only 2. then from the lower corner of gill-opening on the left side 4, on the right 3, then follow two short series of 2 to 3 spines behind the pectorals. Between the dorsals are a pair of blunt spines. The belly is densely set with warts, and behind anus blunt spines among which 2 are prominent on each side before the origin of the anal. Between the second dorsal and the anal the sides are covered with closely packed blunt spines or warts.

In the description of his new genus Cyclopteroides, Garman (1892 p. 37) writes «Chin with tubular pores or barbels», and Popov (1930 p. 70) notes in his key for Cyclopteridae as characteristic for Cyclopteroides «tubular barbel-like processes on chin». But Popov writes (1928 p. 62) in the description of Eumicrotremus birulai, Popov «On underjaw hardly perceptible leathery tubes», and (1930 p. 71) in the description of Eumicrotremus orbis, Günther «tubular, barbel like processes present on chin». Also Vladykov (1933 p. 22) mentions barbel-like tentacles on chin as present in Eumicrotremus spinosus, Müller, but absent in Eumicrotremus derjugini Popov. Further Myers and Böhlke (1950 p. 201) write for Eumicrotremus terrae-novae. «A pair of tubular barbel-like processes on either side of the frenum. There are three or four more of these «barbels «more or less irregular placed, on either side of the chin»».

But Jensen (1944) neither mentions or figures such barbels. No barbels are seen in a specimen of E. spinosus 93 mm from West-Greenland whereas a pair of barbels are observed below the middle of the lower jaw in a specimen 63 mm from Icefjord Spitzbergen. These two specimens belong to the museum in Bergen. Therefore there seems to be no reason for being afraid of placing this fish in the genus *Eumicrotremus* in spite of the fact that Garman (1892 p. 37) and Popov (1930 p. 70) mention tubular barbels on chin as character for *Cyclopteroides*. The occurrence of barbels on chin varies and has none specific value.

On the other hand it is essential that Parr (1926 p. 11) in his diagnosis of Cyclopteroides lays stress upon «skin mostly nude only having few, small and distant tubercles, not forming a continuous covering, and totally absent from cheeks and finbases».

The Russian ichthyologists have created 6 (Popov 1930 pp. 71—72)

or 7 (Taranetz 1937 p. 126) species of *Eumicrotremus*, but since there is great variability in the skin's equipment with spines, it seems more likely to follow JENSEN (1944 pp. 53—57) who introduced the subspecies *Eumicrotremus variabilis* for 5 different varieties of *Eumicrotremus spinosus* Fabricius. Therefore this specimen is not considered as a new species, but as a new variety, which is given the name *Eumicrotremus spinosus subspec. nov. eggvinii.*

The specimen caught near Jan Mayen described by Danois (1917 p. 14 fig. 4, pl. 1 figs. 5—6) has an armament in rows nearly as the specimen from the Eggvin Bank, but it wants the densely packed spines or warts on the tail. In this respect it resembles more Jensen's subspecies variabilis var. d, but after the figures accompanying the description of Danois the dorsals and the anal are more free from the skin than in the variety of Jensen's and resemble the specimen here described.

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EXPLANATION OF PLATES

I

A. Theragra finnmarchica, n. sp. Drawing by Thorolf Rasmussen.

B. Theragra chalcogramma, Pallas. Drawing by Thorolf Rasmussen.

II

A. Theragra chalcogramma, Pallas. From a drawing by by H. L. Todd in F A Lucas: The food of the northern fur seals 1899, pl. XIII.

B. Theragra chalcogramma. From V. K. Soldatov and G. J. Lindberg: A review of the fishes of the seas of the far east. 1930, fig. 74.

III

A. Gadus poutassou, Risso 28 cm ♀. Drawing by Thorolf Rasmussen.

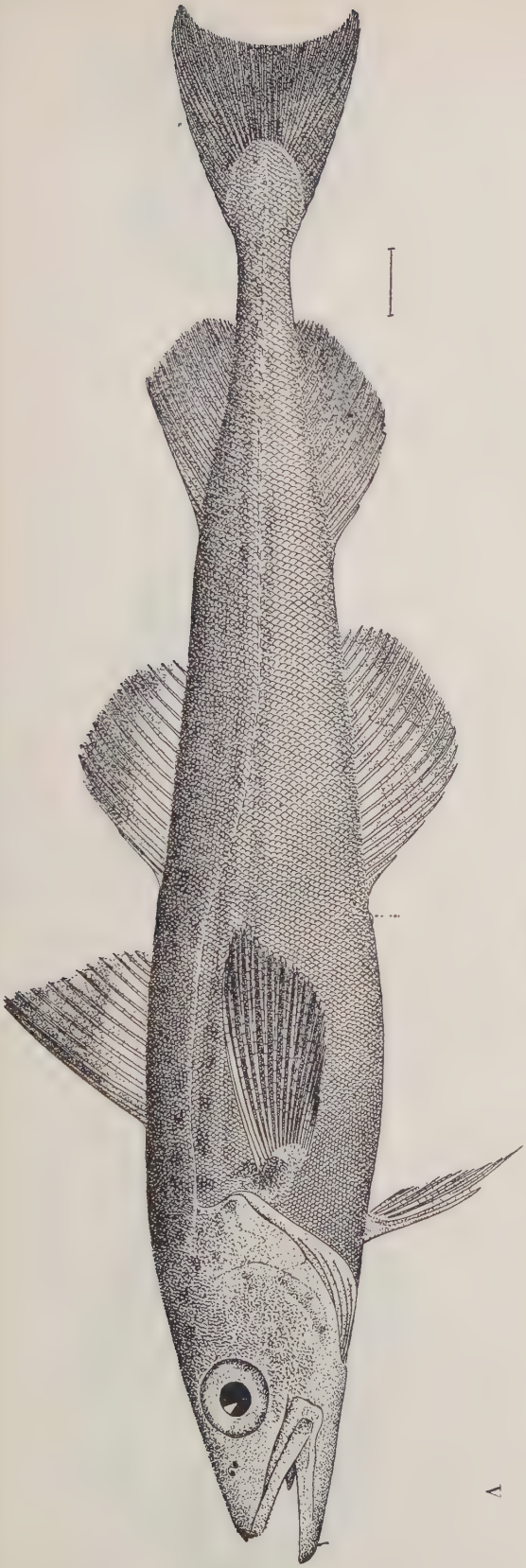
B. Eumicrotremus subspec. nova eggvinii. Lateral view. Drawing by Thorolf Rasmussen.

C. Eumicrotremus subspec. nova eggvinii. Ventral view. Drawing by Thorolf Rasmussen.

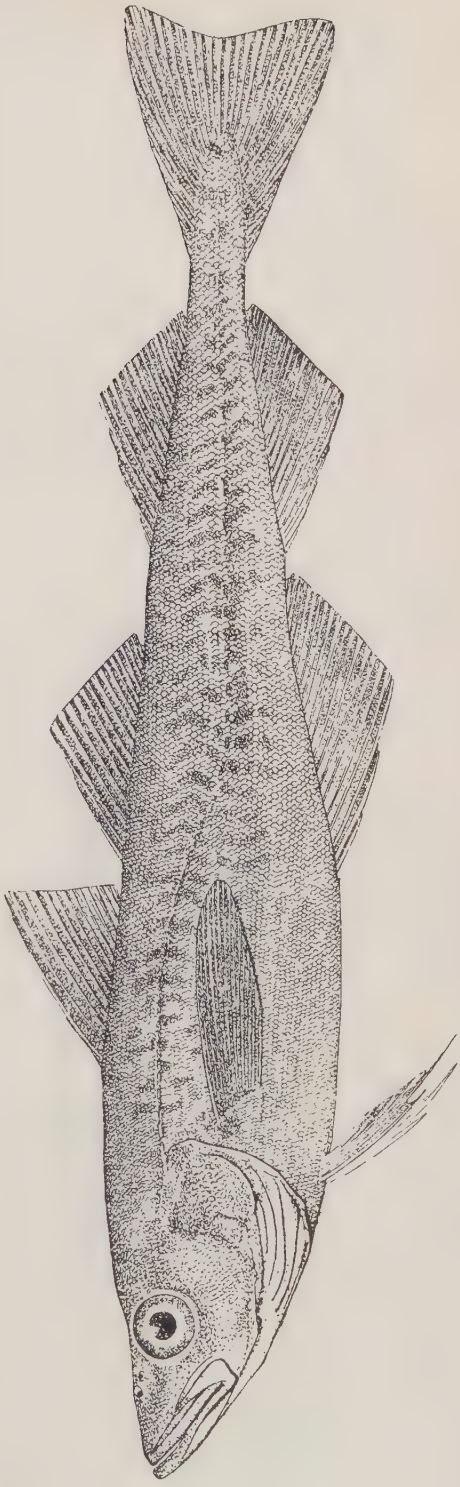
D. Eumicrotremus subspec. nova eggvinii. Frontal view. Drawing by Thorolf Rasmussen.

A

B



A



B

A

B

C

D